REMARKS

Claims 28-31 are currently pending in the present application.

Claim Amendments:

Claims 1-27 and 32-36 have been canceled, without prejudice to the filing of one or more divisional applications directed to the subject matter thereof, pursuant to the Restriction Requirement maintained by the Examiner in the final Office Action. Claim 28 has been amended to specify that the first work piece is ***cylindrical***, and that the recited upset forging and forging back steps are carried out such that each upset forging and forging back increases or reduces, respectively, the diameter of the recited work piece ***relative to a longitudinal axis of the cylindrical first work piece***. Support for the amendments made herein can be found throughout the Specification, for example, at page 4, lines 25-27, and at pages 5-7 in the description of the upset forging and forging back steps. No new matter is introduced by the amendments made herein. A complete listing of all claims ever presented is set forth herein in accordance with 37 C.F.R. §1.121(c)(1). Entry of the amendments made herein in conjunction with the accompanying RCE is respectfully requested.

Rejection Under 35 U.S.C. §103:

In the final Office Action, the Examiner rejects claims 28-31 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0112789 of Jepson, *et al.* ("Jepson"), in view of U.S. Patent No. 6,283,357 of Kulkarni, *et al.*, ("Kulkarni"), further in view of U.S. Patent No. 6,142,001 of Collier, *et al.*, ("Collier").

The Examiner maintains that Jepson discloses repeated forging and annealing steps for the production of a sputtering target. The Examiner acknowledges that Jepson does NOT teach deep-drawing and the attachment of a collar to the target. In an attempt to remedy these acknowledged deficiencies of the Jepson reference, the Examiner argues that Kulkarni discloses the deep-drawing of a rolled target plate and the attachment of a collar. The Examiner argues that it would have been obvious to one of ordinary skill in the art to deep-draw the target

of Jepson using the disclosure of Kulkarni, and further attach a collar according to Kulkarni to arrive at a cup shape magnetron sputtering target.

However, the Examiner further acknowledges that the Jepson/Kulkarni combination still fails to teach the claimed finite element modeling. In an attempt to remedy this admitted deficiency of the Jepson/Kulkarni combination, the Examiner argues that one of ordinary skill in the art would have been motivated to employ finite element modeling, as used in Collier, with the combined disclosure of Jepson and Kulkarni to determine target size during processing.

Applicant respectfully traverses the Examiner's rejection and the arguments and contentions set forth in support thereof for at least the following reasons.

To begin with, Applicant respectfully reiterates that the claimed invention is directed to a sputtering target comprising a refractory metal pot and a collar attached thereto, wherein the pot is prepared by a process comprising (a) through (k), in said order: (a) cutting an ingot to form a cylindrical work piece; (b) upset forging; (c) annealing; (d) forging-back; (e) upset forging; (f) forging-back; (g) annealing; (h) upset forging; (i) annealing; (j) rolling; and (k) deep-drawing; wherein dimensions of at least one of the work pieces are pre-determined with a computer-implemented finite element modeling assessment, and wherein the upset forging and forging back of the work pieces is carried out such that the diameter in each instance is increased or reduced, respectively (by upset forging and forging back), relative to a longitudinal axis of the cylindrical first work piece.

In the final Office Action, the Examiner indicates that Applicant's prior response was not persuasive because "Applicant's claims do not positively set forth upset forging along a single axis." (*See*, the final Office Action, p. 4). Applicant respectfully submits that the claims, as amended herein, now positively recite the upset forging and forging back of the recited work pieces all along a longitudinal axis of the cylindrical first work piece. Accordingly, Applicant respectfully traverses the Examiner's rejection and the arguments and contentions set forth in support thereof for at least the following reasons.

In accordance with the claimed invention, each of the forgings (upset forgings; (b), (e) and (h) and the forgings-back (d) and (f)) is carried out along the same axis, *i.e.*, along the longitudinal axis of the cylindrical first work piece. "Upset forging," as claimed herein, compresses a cylindrical work piece in a direction along or in-line with its longitudinal axis. Forging back draws the compressed work piece back into a more elongated cylinder shape ***along the same axis***. Thus, while Jepson does describe the preparation of a plate comprising a refractory metal wherein multiple forgings and annealing steps are carried out, it is critical to recognize that **the processes described in Jepson require side-forging** to produce the generally rectangular plates described therein. In contrast to the claimed invention, ***Jepson describes processes wherein a work piece is side-forged in a direction perpendicular to the original longitudinal axis of the work piece***. (*See, e.g.*, Jepson, Fig. 1, and ¶ [0014], ". . . pressure working the pieces along alternating essentially *orthogonal* work axes.").

Thus, to begin with, Jepson does not teach or suggest the claimed process for forming the claimed pot. One of ordinary skill in the art would have ***no reasoned motivation to exclude the specifically required side-forging*** of the Jepson reference. Stated another way, one of ordinary skill in the art would have no motivation to modify Jepson to carry out repeated forgings and forging-back operations along the same axis. It is also important to recognize that the claimed process of forming the pot results in differences in the pot *per se*, not merely in the process by which it is formed. For example, by specifically upset forging the annealed fifth work piece, ***rather than flat-forging*** (*i.e.*, side forging), the through-thickness texture gradient is improved. (*See, e.g.*, Applicant's Specification, p. 6, lines 23-29; ¶ [0025] as published). This is not taught, suggested or even recognized in the cited art.

Kulkarni fails to remedy this deficiency of the Jepson reference. Nothing in either Jepson or Kulkarni teaches, suggests or motivates the repeated upset forging and forging back all along the same longitudinal axis of a cylindrical work piece. Accordingly, Applicant respectfully submits that the combination of Jepson and Kulkarni fails to teach or suggest each and every element of Applicant's claimed invention, even before considering the additionally required use of finite element modeling as claimed.

The Examiner cites Collier to address the failure of the Jepson/Kulkarni combination to teach or suggest the use of finite element modeling. Applicant respectfully submits that Collier's use of finite element modeling in the billet piercing extrusion of steel (or alloys thereof) to form gas cylinders is ***not*** a basis upon which one of ordinary skill in the art would find motivation to apply such modeling to the production of refractory metal pots for sputtering targets.

To begin with, the fabrication of steel gas cylinders and the production of sputtering targets are not analogous arts. Moreover, the use of finite element modeling in Collier to help ensure that an inner cylinder liner fits an outer cylinder shell would not motivate one of ordinary skill in the art of sputtering target formation to employ finite element modeling to size sputtering target work pieces to achieve workings that lead to more uniform grain-size and more uniform crystallographic texture. (*See, e.g.*, Applicant's Specification, p. 11, lines 15-19 & p. 15, lines 10-18). The use of finite element modeling in the claimed invention to avoid "folds" and other imperfections in the claimed pots is entirely different than the use of such modeling in Collier to achieve uniform cladding of the disclosed gas cylinders. **Collier, at best, merely serves to evidence that finite element modeling *exists* as a tool in gas cylinder formation.** There is no teaching or suggestion to use any such system in the production of refractory metal sputtering targets.

Accordingly, Applicant respectfully submits that one of ordinary skill in the art would have no motivation to modify the cited combination of Jepson and Kulkarni with the teachings of Collier, and certainly not in a manner whereby dimensions of a target work piece are modeled to avoid folds and other imperfections of importance in the deep-drawn, pot-shaped, sputtering target field. Thus, the combination of Jepson, Kulkarni and Collier fails to satisfy the criteria necessary to establish *prima facie* obviousness. Reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion:

Applicant submits that all pending claims patentably distinguish over the prior art of record. Reconsideration, withdrawal of the rejection and a Notice of Allowance are respectfully requested.

Respectfully submitted,

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(Date)

By: _____

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